Amendments To The Drawings:

None.

Remarks

This Letter is in response to the Office Action dated **December 23, 2004**. The Office Action contained: 1) a **restriction requirement**, 2) an **obviousness rejection**, and 3) a **double patenting rejection**. The following remarks address these issues and include section 4) **supplemental examples** of factual evidence supporting Applicant's remarks. Claims 1-13 remain pending. Claims 6-13 have been withdrawn from consideration.

1. Election/Restrictions

The Office Action stated that the application contained five patentably distinct Groups. Consonant with the requirements of 35 U.S.C. § 121, applicant identifies Group I which reads on claims 1-5 as the elected Group. Applicant has withdrawn claims 6-13 without prejudice or disclaimer. Applicant reserves the right to prosecute the subject matter of claims 6-13 in an application claiming priority from the original filing.

This election is a follow up to applicant's provisional election made during a telephone conversation on December 14, 2004. During this conversation, attorney Scott Q. Vidas provisionally elected to prosecute the invention of Group I without traverse. Applicant hereby affirms Mr. Vidas's provisional election with this written response.

2(a). 35 USC 103(a) Rejections

The Office Action has rejected claims 1-5 under 35 U.S.C. § 103(a) as being unpatentable over Tsuchiya et al ('872). The Office Action has rejected claims 1-5 under 35 U.S.C. § 103(a) as being unpatentable over the combined teachings of Inoue (652) and Tsaur. The Office Action has rejected claims 1-4 under 35 U.S.C. § 103(a) as being unpatentable over the combined teachings

of Inoue et al (672) and Tsaur. The Office Action has rejected claims 1-5 under 35 U.S.C. § 103(a) as being unpatentable over the combined teachings of Sasaki and Tsaur. The applicant disagrees.

2(b). Rationale of the Rejections

The present invention was made based on a newly discovered fact that simultaneous use of hydroxyethyl cellulose (HEC) and polyethylene oxide (PEO) achieves excellent haze level reduction of a wafer surface without deteriorating LPD and surface conditions. The composition of the present invention, which contains both HEC and PEO, efficiently reduces haze level of a wafer surface due to the synergistic action of HEC and PEO. The polishing composition also improves LPD and surface conditions of the wafer surface.

The Office Action states that, although there is no prior art disclosing a solution combining HEC and PEO, this solution is obvious because each of these materials are disclosed as interchangeable components in a different disclosed solution and it is obvious to combine two or more interchangeable components to make a hybrid solution. In re Kerkhoven 205 USPQ 1069. This assumption of obviousness however, does not apply by inventions such as this one where the undisclosed solution produces unexpected results. Stratoflex, Inc. v. Aeroquip Corp., 713 F.2d 1530, 1538, 218 USPQ 871, 879 (Fed. Cir. 1983).

2(c). Brief Summary of the Office Action's Mistake

For at least three reasons, this invention can be described as containing non-obvious unexpected results. First, because the invention uses a synergistic action of HEC and PEO to efficiently reduce wafer haze level, it demonstrates an effect which is greater than the sum of

each of the effects taken separately. Merck & Co. Inc. v. Biocraft Laboratories Inc., 874 F.2d 804, 10 USPQ2d 1843 (Fed. Cir.), *cert. denied*, 493 U.S. 975 (1989). Second, its ability to improve LPD and surface conditions of the wafer surface are examples of non-obvious unexpected results where the invention produces a superior result than those in the spectrum of common properties. In re Chupp, 816 F.2d 643, 646, 2 USPQ2d 1437, 1439 (Fed. Cir. 1987). And third, as an excellent wafer surface haze level reducer, the invention possess a property not found in the prior art. In re Papesch, 315 F.2d 381, 137 USPQ 43 (CCPA 1963). The supplemental examples and Tables A and B in section 4 of the Remarks provide factual evidence of these unexpected and superior results produced by the synergistic action of HEC and PEO. In re De Blauwe, 736 F.2d 699, 705, 222 USPQ 191, 196 (Fed. Cir. 1984). The following subsections address specific points raised by the Office Action:

2(d). "Conventional polishing slurries" is a clearly defined term to which the invention is not obvious

The Office Action acknowledged that the invention could be shown to be non-obvious if the term "conventional polishing slurries" were clearly defined and if it were factually proven that the invention's synergistic action between HEC and PEO is an unexpected improvement over the effectiveness of conventional polishing slurries. (Office Action, Page 11 lines 1-14). Table B listed in Section 4 of the Remarks clearly defines conventional polishing slurries and Table A illustrates the invention's synergistic superiority over them.

2(e). The claims as written are supported by factual evidence of synergy

The Office Action states that although a synergistic effect for specific amounts of HEC and PEO may be patentable, the claims are directed to general amounts of HEC and PEO which are unsupported by the description. The Supplemental Examples listed in Section 4 however illustrates that the claims need not list specific amounts because all possible mixtures of HEC and PEO will produce some synergistic effect. Because the claims as written always define a synergistic effect, the claim language as written is non-obvious.

2(f). The application need not list an unclaimed range

The Office Action states that the invention is obvious because the invention does not compare the claimed invention with a significant number of values outside of the claimed range. The Supplemental Examples listed in Section 4 illustrate that the application need not list a significant number of values outside of a claimed range because all possible mixtures of HEC and PEO in the claimed range will produce some synergistic effect so the claimed invention is non-obvious.

2(g). The invention not obvious over Tsuchiya et al ('872)

Tsuchiya et al ('872) discloses a chemical mechanical polishing slurry (CMP slurry) suitable for polishing a metal film. Tsuchiya et al teaches that a thickener (PEO) can be blended in the CMP slurry. However, Tsuchiya et al does not teach or suggest the use of PEO for reducing haze level of a wafer surface. Tsuchiya et al does not teach or suggest the use of HEC for reducing haze level of a wafer surface. Therefore Tsuchiya does not teach or suggest the simultaneous use of HEC and PEO for reducing haze level of a wafer surface.

Tsaur merely teaches that PEO is a water-soluble polymer. Tsaur does not teach the use of PEO for reducing haze level of a wafer surface.

2(h). The invention is not obvious over Inoue et al. (652) in view of Tsaur

Inoue (652) discloses an edge polishing composition suitable for polishing an edge surface of a wafer. Col. 5, lines 50-51 of Inoue (652) teaches that hydroxyethyl cellulose can be added to the edge polishing composition. However, Inoue (652) fails to teach or suggest that hydroxyethyl cellulose is added for reducing haze level of the wafer surface.

Col. 5, lines 50-51 of Inoue (652) teaches that polyvinyl alcohol can be added to the edge polishing composition. However, Inoue (652) fails to teach or suggest that polyvinyl alcohol is added for reducing haze level of the wafer surface. Therefore, Inoue (652) does not teach or suggest the simultaneous use of HEC and PEO for reducing haze level of a wafer surface. Since Inoue (652) does not teach or suggest the simultaneous use of HEC and PEO for reducing haze level of a wafer surface, Inone (652) does not teach that the simultaneous use of HEC and PEO is particularly effective for reducing haze level of a wafer surface. It is submitted that there is no motivation to arrive at the present invention based on a combination of Inoue (652) and Tsaur.

Furthermore, Inoue (652) is directed to an edge polishing composition, not to a composition for reducing haze level a wafer surface. Since it is not required for an edge polishing composition to have a function of haze level reduction, there is no motivation to combine Inoue (652) with Tsaur to arrive the present invention.

2(i). The invention is not obvious over Inoue et al. (672) in view of Tsaur

Inoue et al. (672) discloses a polishing composition, or a surface treating composition, suitable for surface treatment of a semiconductor wafer. The composition contains a water-soluble polymer, such as hydroxyethyl cellulose. Paragraph 0035 of Inoue (672) describes that the water-soluble polymer has a function to provide hydrophilicity on the wafer surface so that the wafer surface will not dry up in a short period of time. However, Inone (672) fails to teach or suggest the use of hydroxyethyl cellulose for reducing haze level of the wafer surface.

In addition, Inoue (672) fails to teach or suggest the use of polyvinyl alcohol for reducing haze level of the wafer surface. Therefore Inoue (672) does not teach or suggest the simultaneous use of HEC and PEO for reducing haze level of a wafer surface. Since Inone (672) does not teach or suggest the simultaneous use of HEC and PEO for reducing haze level of a wafer surface, Inoue (672) does not teach that the simultaneous use of HEC and PEO is particularly effective for reducing haze level of a wafer surface. It is submitted that there is no motivation to arrive at the present invention base on a combination of Inoue (672) and Tsaur.

2(j). The invention not obvious over Sasaki in view of Tsaur

Sasaki discloses a final polishing composition containing a water-soluble polymeric compound, such as hydroxypropyl cellulose. Col. 21, lines 3-20 of Sasaki describes that the water—soluble polymeric compound serves to form a regular laminar flow between a polishing cloth and the surface of the wafer to make the wafer surface even more smooth. However, Sasaki fails to teach or suggest that the water-soluble polymeric compound serves to reduce haze level of the wafer surface. In addition, Sasaki fails to teach or suggest the use of HEC for reducing the haze level of the wafer surface. Since Sasaki does not teach or suggest the simultaneous use of

HEC and PEO for reducing haze level of a wafer surface, Sasaki does not teach that the simultaneous use of NEC and PEO is particularly effective for reducing haze level of a wafer surface. It is submitted that there is no motivation to arrive the present invention base on a combination of Sasaki and Tsaur.

2(k). 35 USC 103(a) Conclusion

None of the references suggest or teach the use of hydroxyethyl cellulose (HEC) for reducing haze level of a wafer surface. None of the references suggest or teach that polyethylene oxide (PEO) contributes to the reduction of haze level. And, none of the references suggest or teach a synergistic action of NEC and PEO in wafer polishing. For at least these reasons, claims 1-5 are patentable over all the references cited in the Office Action.

Withdrawal of the rejection is respectfully requested.

3. Double Patenting Rejections

The Office Action has provisionally rejected claims 1-5 under the judicially created doctrine of obviousness-type double patenting as being unpatentable over all of the claims of co-pending application 10/673,779, and also over claims 1-10 of co-pending application 10/673,767. Because the three applications are for distinctly different inventions, applicant filed three separate applications on the same day to avoid burdening the examiner with the need to issue a restriction requirement. These differences are also the reason why the double patenting rejection was in error.

Judicially created double patenting rejections are improper when the rejected claims are patentably distinct. Eli Lilly & Co. v. Barr Labs., Inc., 251 F.3d 955, 58 USPQ2d 1865 (Fed. Cir.

2001); Ex parte Davis, 56 USPQ2d 1434, 1435-36 (Bd. Pat. App. & Inter. 2000). Proving claims are patently distinct in response to obvious type double patenting rejections is done by proving non-obviousness. In re Braat, 937 F.2d 589, 19 USPQ2d 1289 (Fed. Cir. 1991); In re Longi, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985).

As explained in Section 2 of the remarks, this invention is not obvious in light of an invention that merely mentions water soluble polymers. Only a claim specifically mentioning combining HEC and PEO would address the non-obvious unexpected and superior haze reducing effects this mixture produces. 10/673,779 describes a wafer surface polisher and 10/673,767 describes a wafer edge polisher. Both applications claim a water soluble polymer but say nothing about mixing HEC and PEO. Their use of the term water soluble polymer does not suggest or teach that the simultaneous use of HEC and PEO is particularly effective for reducing haze level of a wafer surface and do not disclose the unexpected and superior combined effects. As a result, the double patenting rejections should be withdrawn. For at least these reasons, it is not necessary to file a terminal disclaimer at this time.

Withdrawal of the rejection is respectfully requested.

4(a). Supplemental Examples

The applicant would like to submit the attached sheet including Tables A and B as factual evidence of the superior unexpected synergistic action of HEC and PEO. Table A shows Supplemental Examples of polishing compositions according to the present invention. Table B shows Supplemental Comparative Examples of polishing compositions (what the specification refers to as "conventional polishing slurries"). Supplemental Examples 1-3, 5, and 6 are identical to Examples 1-3, 5, and 6 shown in Table 1 of the specification. Supplemental

Comparative Examples 1 and 9 are identical to Comparative Examples 1 and 9 shown in Table 2 of the specification.

4(b). Supplemental Examples 1, 1a, 6, and 6a

Concentrations of PEO in the polishing compositions of Supplemental Examples 1, 1a, 6, and 6a and Supplemental Comparative Example 9 are the same. The polishing results of Supplemental Examples 1, 1a, 6, and 6a are better than that of Supplemental Comparative Example 9. This supports the synergistic effect of HEC and PEO. This suggests that PEO enhances the haze level reduction effect of HEC.

4(c). Supplemental Examples 1 and 1a

Concentration of HEC in the polishing composition of Supplemental Example 1a is lower than that of Supplemental Example 1. Supplemental Examples 1 and 1a have substantially the same result. This means that the synergistic effect of HEC and PEO is obtained even if concentration of HEC is relatively low. Also, it is understood that the synergistic effect of HEC and PEO does not vary in proportion to the concentration of NEC when concentration of HEC is relatively low.

4(d). Supplemental Examples 6 and 6a

Concentration of HEC in the polishing composition of Supplemental Example 6a is higher than that of Supplemental Example 6a. Supplemental Examples 6 and 6a have substantially the same result. This supports that the synergistic effect of HEC and PEO

is obtained even if concentration of HEC is relatively high. It is also understood that the synergistic effect of HEC and PEO does not vary in proportion to the concentration of HEC when concentration of HEC is relatively high.

4(e). Supplemental Examples 2, 2a, 3, 5, and 5a

Concentrations of HEC in the polishing compositions of Supplemental Examples 2, 2a, 3, 5, and 5a and Supplemental Comparative Example 5 are the same. Supplemental Examples 2, 2a, 3, 5, and 5a demonstrate excellent results in all of haze level, LPD, and surface conditions. This supports the synergistic effect of HEC and PEO.

4(f). Supplemental Comparative Examples 5-5d and 9-9d

As shown in Table B, the polishing compositions of Supplemental Comparative Examples 5-5d contain HEC at different concentrations. Haze levels of Supplemental Comparative Examples 5-5d are poor with respect to those of Supplemental Examples. The polishing compositions of Supplemental Comparative Examples 5a and 5d can not improve LPD's. Note that the polishing composition of Supplemental Comparative Example 5 deteriorates surface conditions. Accordingly the use of HEC alone does not provide excellent haze level reduction of a wafer surface without deteriorating LPD and surface conditions of the wafer surface.

The polishing compositions of Supplemental Comparative Examples 9-9d contain PEO at different concentrations. The polishing results of Supplemental Comparative Examples 9-9d are poor. It is not apparent that PEO has a function of haze level

reduction or enhances the haze level reduction effect of HEC based on the Supplemental Comparative Examples 9-9d.

4(g). Supplemental Examples Conclusion

The polishing composition according to the present invention provides excellent haze level reduction of a wafer surface without deteriorating LPD and surface conditions of the wafer surface. This advantage is not obvious from the teachings of the references. In light of the above, the applicant submits that present claims 1-5 define patentable subject matter and are in condition for allowance. Issuance of a Notice of Allowance is earnestly solicited.

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Table A

Supplemental Examples	ingredient for reducing haze level						ingredient for enhancing polishing rate		haze level	LPD	surface condition
	name	MW $(\times 10^4)$	wt%	name	MW $(\times 10^4)$	wt%	name	wt%			
1a	HEC	1200	0.01	PEO	150~400	0.1	AM	1.0	◎	Δ	-
1	HEC	1200	0.1	PEO	150~400	0.1	AM	1.0	◎	Δ	-
2a	HEC	1200	0.25	PEO	150~400	0.005	AM	1.0	◎	Δ	O
2	HEC	1200	0.25	PEO	150~400	0.01	AM	1.0	◎	Δ	O
3	HEC	1200	0.25	PEO	150~400	0.1	AM	1.0	☆	Δ	◎
5	HEC	1200	0.25	PEO	150~400	0.3	AM	1.0	◎	Δ	◎
5a	HEC	1200	0.25	PEO	150~400	0.5	AM	1.0	◎	Δ	-
6	HEC	1200	0.5	PEO	150~400	0.1	AM	1.0	◎	Δ	-
6a	HEC	1200	1	PEO	150~400	0.1	AM	1.0	◎	Δ	-

Table B

Supplemental Comparative Examples	ingredient for reducing haze level						ingredient for enhancing polishing rate		haze level	LPD	surface condition
	name	MW $(\times 10^4)$	wt%	name	MW $(\times 10^4)$	wt%	name	wt%			
Comp. Ex. 5a	HEC	1200	0.01		-		AM	1.0	Δ	×	-
Comp. Ex. 5b	HEC	1200	0.1		-		AM	1.0	O	Δ	-
Comp. Ex. 5	HEC	1200	0.25		-		AM	1.0	O	Δ	×
Comp. Ex. 5c	HEC	1200	0.5		-		AM	1.0	O	Δ	-
Comp. Ex. 5d	HEC	1200	1		-		AM	1.0	O	×	-
Comp. Ex. 9a		-		PEO	150~400	0.005	AM	1.0	×	×	-
Comp. Ex. 9b		-		PEO	150~400	0.01	AM	1.0	Δ	×	-
Comp. Ex. 9		-		PEO	150~400	0.1	AM	1.0	O	×	-
Comp. Ex. 9c		-		PEO	150~400	0.3	AM	1.0	Δ	×	-
Comp. Ex. 9d		-		PEO	150~400	0.5	AM	1.0	×	×	-

HEC: hydroxyethyl cellulose
PEO: polyethylene oxide
AM: 29wt% ammonium solution
As for evaluation of the polishing results, see the specification.
Examples 1-3, 5, 6, and Comparative Examples 5, 9 were described on the originally filed specification.
Examples 1a, 2a, 5a, 6a, and Comparative Examples 5a-5d, 9a-9d are newly presented.

Conclusion

For the reasons stated above, applicant believes claims 1- 5 are allowable. Applicant respectfully requests notification to that effect.

Respectfully submitted,

VIDAS, ARRETT & STEINKRAUS

Date: April 6, 2005

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